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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/581,875

08/28/2006

JinKook Lee

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FAY SHARPE LLP

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CLEVELAND, OH 44114

EXAMINER

VERDIER, CHRISTOPHER M

ART UNIT

PAPER NUMBER

3745

MAIL DATE

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/581,875	<b>Applicant(s)</b> LEE, JINKOOK	
	<b>Examiner</b> Christopher Verdier	<b>Art Unit</b> 3745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 28 April 2008.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-6 and 8-19 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 17-19 is/are allowed.
- 6) ☒ Claim(s) 1-3, 5, 6 and 8-16 is/are rejected.
- 7) ☒ Claim(s) 4 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 4-28-08 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

Applicant's amendment dated April 28, 2008 has been carefully considered but is non-persuasive. The new declaration is acceptable. The Replacements Sheets for figures 1 and 3 and the amendments to the specification overcome the drawing objections set forth in the first Office action. The abstract has been amended to correct the informality set forth in the first Office action. The specification has been amended to correct the informalities set forth therein. Correction of these matters is noted with appreciation.

Applicant's argument that amended independent claim 1 defines over the publication "An Experimental Study of Cavitation in A Mixed Flow Impeller" is persuasive. Applicant's argument that amended independent claim 1 defines over Kun 4,904,158 is persuasive. Applicant's argument that amended independent claim 1 defines over Meng 6,435,829 is persuasive. Applicant's argument that amended independent claims 1 and 17 define over Coats 1,874,450 is persuasive. Applicant's argument that original claim 13 defines over Coats 1,874,450, because Coats discloses a hub for a plurality of blades 5 disposed about the hub, with the blades 5 being of the same shape and size, and as such, a blade 5 which is interposed between blades 5 having the same shape and size is not a claimed secondary blade, is not persuasive. Claim 13 does not require that the blades be of different size or shape, and the designation of whether a blade is designated as a primary blade or a secondary blade is an arbitrary convention. Therefore, alternate blades 5 may be designated as the primary blades, and the intervening blades 5 may be designated as the secondary blades.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 8-11 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 8-10 depend on cancelled claim 7, and the scope of claims 8-10 is unclear, since it is unclear which claim that claims 8-10 depend on. Claim 11 depends on claim 10, and the scope is unclear for the same reason. In claim 8, line 1, “the primary blades” lacks antecedent basis. In claim 8, line 2, “the hub” lacks antecedent basis. In claim 9, lines 1-2, “each primary blade” lacks antecedent basis. In claim 10, lines 1-2, “each secondary blade” lacks antecedent basis.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3 and 5-6 are rejected under 35 U.S.C. 102(b) as being anticipated by United Kingdom Patent 567,368 (figures 4-5 and 6-7). Disclosed is high performance inducer for pumping cryogenic two phase fluids from reservoirs comprising a hub 1 including a first portion having a first diameter and a second portion having a second diameter larger than the first

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diameter; a plurality of primary blades 2 (figures 4-5) or a plurality of primary blades (the leftmost and right most blades 10 in figures 6-7) having a generally helical conformation circumferentially disposed about the hub, each primary blade having a first length; and a plurality of secondary blades 9 (figure 4-5) or a plurality of secondary blades (the middle blades 10 in figures 6-7) circumferentially disposed about the hub, each secondary blade being interposed between two primary blades and having a second length different than the first length. The hub increases in diameter from the first portion to the second portion. A radial depth of the plurality of primary and secondary blades is substantially greater at the first portion of the hub than at the second portion of the hub. The first portion includes a generally rounded end (to the right in figures 5 and 7) and a concentric sidewall extending both radially outward and axially from the rounded end. The sidewall has a general curvilinear conformation.

Claims 8 and 10, as far as they are definite and understood, are rejected under 35 U.S.C. 102(b) as being anticipated by the publication "An Experimental Study of Cavitation in A Mixed Flow Impeller" (figure 1, impellers A and B, and figure 2). Note the plural primary blades extending circumferentially about a hub generally 180 degrees from a leading edge to a trailing edge thereof. A leading edge of each secondary blade is circumferentially spaced generally 60 degrees from a leading edge of an adjacent primary blade (see in particular impeller A).

Claim 9, as far as it is definite and understood, is rejected under 35 U.S.C. 102(b) as being anticipated by Mottram 3,442,220. Mottram (figures 2-3) discloses an impeller with a

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hub 1 having primary blades 2, each blade having a leading edge spaced generally 120 degrees from a leading edge of an adjacent primary blade.

Claims 13-15 are rejected under 35 U.S.C. 102(b) as being anticipated by Coats 1,874,450 (figures 1-2). Disclosed is an inducer of a downhole pump assembly including casing 1 for pumping a liquefied gas stored in a reservoir that includes two phase fluid components, the inducer comprising a hub 6 with a first portion having a first diameter and a second portion having a second diameter larger than the first diameter, plural primary blades 5 circumferentially disposed about the hub, plural secondary blades 5 circumferentially disposed about the hub, with each secondary blade being interposed between two primary blades, the hub increasing in diameter from the first portion to the second portion, a radial depth of the plural primary and secondary blades being substantially greater at the first portion of the hub than at the second portion of the hub, an outer diameter of each primary blade and each secondary blade being generally constant from a leading edge to a trailing edge of the primary and secondary blades, the blades having a generally helical conformation.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 11, as far as it is definite and understood, is rejected under 35 U.S.C. 103(a) as being unpatentable over the publication “An Experimental Study of Cavitation in A Mixed Flow Impeller”. Figure 1, impellers A and B, and figure 2 of the publication “An Experimental Study of Cavitation in A Mixed Flow Impeller” disclose a high performance inducer substantially as claimed as set forth above including secondary blades each with a leading edge and a trailing edge, but do not disclose that a circumferential extent from the leading edge of each secondary blade to the trailing edge of each secondary blade is generally 150 degrees.

The recitation of the circumferential extent from the leading edge of each secondary blade to the trailing edge of each secondary blade being generally 150 degrees is a matter of choice in design. The circumferential extent from a leading edge of a helical blade to a trailing edge of the blade in an inducer is known to be a result effective variable which influences the efficiency and head of the inducer. It would have been obvious at the time the invention was made to a person having ordinary skill in the art to form the impellers A and B of the publication “An Experimental Study of Cavitation in A Mixed Flow Impeller” such that the circumferential extent from the leading edge of each secondary blade to the trailing edge of each secondary blade is generally 150 degrees, for the purpose of optimizing the efficiency and head, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over United Kingdom Patent 567,368 in view of Rylewski 3,522,997. The United Kingdom Patent 567,368 (figures 4-7) discloses a high performance inducer substantially as claimed as set forth above, but does not disclose that the primary blades and secondary blades have a thickness that tapers from a leading edge of the primary and second blades to a substantially constant thickness over the remaining circumferential extent of the primary and secondary blades.

Rylewski 3,522,997 (figures 2-3 and column 4, lines 42-47) shows an inducer 10 having blades 13, 13' that have a thickness that tapers from a leading edge of the blades to a substantially constant thickness over the remaining circumferential extent of the blades, for the purpose of providing constant flow over the blades.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to form the primary blades and secondary blades of United Kingdom Patent 567,368 such that the primary blades and secondary blades have a thickness that tapers from a leading edge of the primary and second blades to a substantially constant thickness over the remaining circumferential extent of the primary and secondary blades, as taught by Rylewski 3,522,997, for the purpose of providing constant flow over the blades.

Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Coats 1,874,450 in view of Rylewski 3,522,997. Coats discloses a high performance inducer substantially as claimed as set forth above, but does not disclose that the primary blades and secondary blades

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have a thickness that tapers from a leading edge of the primary and second blades to a substantially constant thickness over the remaining circumferential extent of the primary and secondary blades.

Rylewski 3,522,997 (figures 2-3 and column 4, lines 42-47) shows an inducer 10 having blades 13, 13' that have a thickness that tapers from a leading edge of the blades to a substantially constant thickness over the remaining circumferential extent of the blades, for the purpose of providing constant flow over the blades.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to form the impeller of Coats such that the primary blades and secondary blades have a thickness that tapers from a leading edge of the primary and second blades to a substantially constant thickness over the remaining circumferential extent of the primary and secondary blades, as taught by Rylewski 3,522,997, for the purpose of providing constant flow over the blades.

***Allowable Subject Matter***

Claims 17-19 are allowed.

Claim 4 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher Verdier whose telephone number is (571) 272-4824. The examiner can normally be reached on Monday-Friday from 10:00-6:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward K. Look can be reached on (571) 272-4820. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Christopher Verdier/  
Primary Examiner, Art Unit 3745

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